WSM

WORKSHOP MANUAL

TRACTOR,ROTARY MOWER, FRONT LOADER

BX1850,BX2350,RCK48-18BX, RCK54-23BX,RCK60B-23BX, RCK48P-18BX,RCK54P-23BX, LA203,LA243

Kubota

KiSC issued 08, 2019 A

SPECIFICATIONS

Model			BX1850	BX2350
PTO power			10.2 kW (13.7 HP)*	13.2 kW (17.7 HP)*
Engine	Maker		KUBOTA	
	Model		D722-E2-BX-2	D902-E2-BX-2
	Type		Indirect Injection, vertical, water-cooled, 4-cycle diesel	
	Number of cylinders		3	
	Bore and stroke		67 × 68 mm (2.64 × 2.68 in.)	72 × 73.6 mm (2.83 × 2.90 in.)
	Total displacement		719 cm^3 (43.9 cu.in.)	898 cm^3 (54.8 cu.in.)
	Engine gross power		13.4 kW (18.0 HP)	17.1 kW (23.0 HP)
	Rated revolution		53.3 r/s [3200 min^{-1} (rpm)]	
	Maximum torque		44.9 N·m (4.6 kgf·m, 33.1 ft-lbs)	56.1 N·m (5.7 kgf·m, 41.4 ft-lbs)
	Battery		12 V, CCA : 435 A, RC : 62 min.	12 V, CCA : 535 A, RC : 80 min.
	Starting system		Electric starting 12 V, 1.4 kW	
	Lubrication system		Forced lubrication by trochoidal pump	
	Cooling system		Pressurized radiator, forced circulation with water pump	
	Fuel		Diesel fuel No. 2-D [above −10 °C (14 °F)], Diesel fuel No. 1 [below −10 °C (14 °F)]	
Capacities	Fuel tank		25 L (6.6 U.S.gals, 5.5 Imp.gals.)	
	Engine crankcase (with filter)		2.9 L (3.1 U.S.qts., 2.6 Imp.qts.)	3.1 L (3.3 U.S.qts., 2.7 Imp.qts.)
	Engine coolant (with recovery tank)		2.9 L (3.1 U.S.qts., 2.6 Imp.qts.)	3.1 L (3.3 U.S.qts., 2.7 Imp.qts.)
	Transmission case		11.6 L (3.06 U.S.gals, 2.55 Imp.gals.)	
	Front axle case		2.3 L (2.4 U.S.qts., 2.0 Imp.qts.)	4.7 L (5.0 U.S.qts., 4.1 Imp.qts.)
Dimensions	Overall length (without 3P)		2035 mm (80.1 in.)	2120 mm (83.5 in.)
	Overall width		1145 mm (45.1 in.)	
	Overall height (with ROPS)		1760 mm (69.3 in.)	1785 mm (70.3 in.)
	Overall height (Top of seat)		1230 mm (48.4 in.)	1255 mm (49.4 in.)
	Wheel base		1340 mm (52.8 in.)	1400 mm (55.1 in.)
	Minimum ground clearance		150 mm (5.9 in.)	175 mm (6.9 in.)
	Tread	Front	880 mm (34.6 in.)	910 mm (35.8 in.)
		Rear	820 mm (32.2 in.)	
Weight (with ROPS)			550 kg (1213 lbs)	565 kg (1245.6 lbs)
Travelling system	Tires	Front	16 × 7.50 – 8 (Turf)	18 × 8.50 – 10 (Turf)
		Rear	24 × 12.00 – 12 (Turf)	26 × 12.00 – 12 (Turf)
	Steering		Hydrostatic power steering	
	Transmission		Main-hydrostatic transmission, Range gear shift (2 forward and 2 reverse)	
	Brake		Wet disk type	
	Min. turning radius (without brake)		2.18 m (7.15 feet)	2.3 m (7.5 feet)
	Differential		Bevel gear	
Hydraulic system	Hydraulic control system		Directional control, auto-return lever system	
	Pump capacity		23.5 L/min. (6.2 U.S.gals./min., 5.2 Imp.gals./min.)	
	Three point hitch		SAE Category I	
	Max. lift force		5394 N (550 kg, 1210 lbs)	
PTO system	Clutch		Wet type, multiple disks	
	Rear	PTO shaft	SAE 1-3/8, 6 splines	
		Revolution	1 speed (540 min^{-1} (rpm) at engine 3142 min^{-1} (rpm))	
	Mid	PTO shaft	USA No. 5 (KUBOTA 10-tooth) involute spline	
		Revolution	1 speed (2500 min^{-1} (rpm) at engine 3043 min^{-1} (rpm))	

NOTE: * Manufacture's estimate
The company reserves the right to change the specifications without notice.

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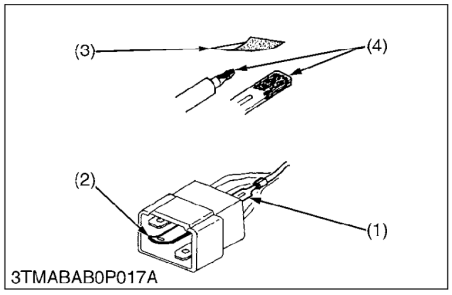

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- Use sandpaper to remove rust from terminals.
- Repair deformed terminal. Make certain there is no terminal being exposed or displaced.

(1) Exposed Terminal
(2) Deformed Terminal
(3) Sandpaper
(4) Rust

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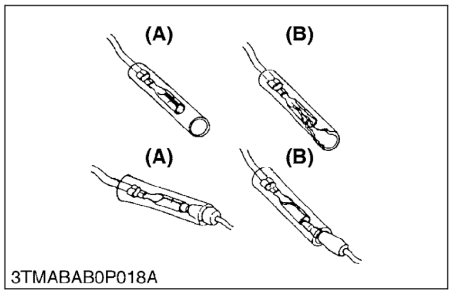

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- Make certain that there is no female connector being too open.

(A) Correct
(B) Incorrect

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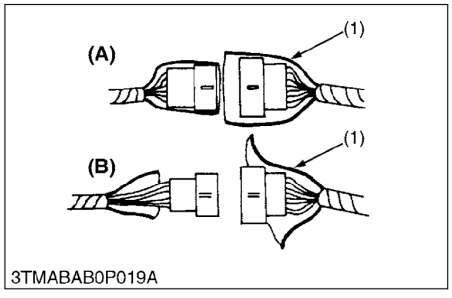

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- Make certain plastic cover is large enough to cover whole connector.

(1) Cover
(A) Correct
(B) Incorrect

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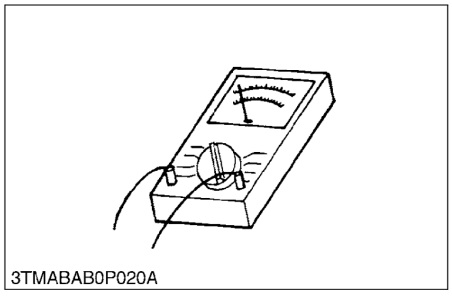
[5] HANDLING OF CIRCUIT TESTER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- Use tester correctly following manual provided with tester.
- Check for polarity and range.

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[4] CHECK POINTS OF EVERY 100 HOURS

Changing Engine Oil

1. See page G-12.

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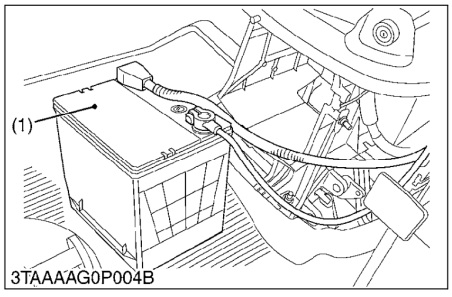

Checking Battery Condition

DANGER

To avoid the possibility of battery explosion:
For the refillable type battery, follow the instructions below.

- **Do not use or charge the refillable type battery if the fluid level is below the LOWER (lower limit level) mark. Otherwise, the battery component parts may prematurely deteriorate, which may shorten the battery's service life or cause an explosion. Check the fluid level regularly and add distilled water as required so that the fluid level is between the UPPER and LOWER levels.**

CAUTION

- **Never remove the vent plugs while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately and get medical attention.**
- **Wear eye protection and rubber gloves when working around battery.**

1. Mishandling the battery shortens the service life and adds to maintenance costs.
2. The original battery is maintenance free type battery, but need some servicing.
   If the battery is weak, the engine is difficult to start and the lights become dim. It is important to check the battery periodically.

(1) Battery

W1015551

[9] CHECK POINT OF EVERY 800 HOURS

Adjusting Engine Valve Clearance

1. See page 1-S13.

W1019995

[10] CHECK POINT OF EVERY 1500 HOURS

Checking Fuel Injection Nozzle Injection Pressure

1. See page 1-S20.

W1020203

[11] CHECK POINT OF EVERY 3000 HOURS

Checking Injection Pump

1. See page 1-S19.

W1020260

[12] CHECK POINT OF EVERY 1 YEAR

Replacing Air Cleaner Element

1. See page G-18.

W1020343

[13] CHECK POINTS OF EVERY 2 YEARS

Replacing Radiator Hoses (Water Pipes)

1. Replace the hoses and clamps.
   Refer to "**Checking Radiator Hoses and Hose Clamps**".
   (See page G-22.)

W1020468

Replacing Power Steering Hoses

1. Replace the hoses.
   Refer to "**Checking Power Steering Line**".
   (See page G-23.)

W1020513

Replacing Fuel Line

1. Replace the hoses and clamps.
   Refer to "**Checking Fuel Line and Fuel Filter**".
   (See page G-19.)

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Replacing Intake Air Line

1. Replace the intake hose.
2. Refer to "**Checking Intake Air Line**".
   (See page G-23.)

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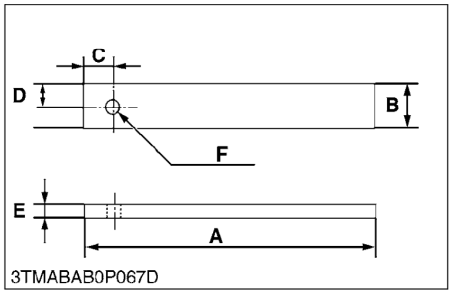

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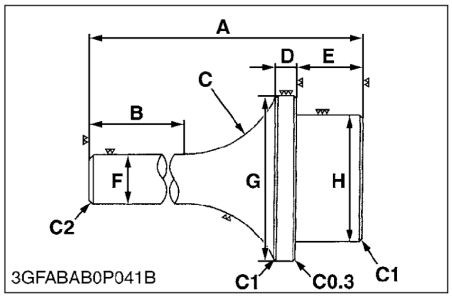

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Flywheel Stopper

Application: Use to loosen and tighten the flywheel screw.

A	200 mm (7.87 in.)
B	30 mm (1.18 in.)
C	20 mm (0.79 in.)
D	15 mm (0.59 in.)
E	8 mm (0.31 in.)
F	10 mm dia. (0.39 in. dia.)

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Crankshaft Bearing 1 Replacing Tool

Application: Use to press out and press fit the crankshaft bearing 1.

[Press Out]

A	135 mm (5.31 in.)
B	72 mm (2.83 in.)
C	40 mm radius (1.57 in. radius)
D	10 mm (0.39 in.)
E	22 mm (0.87 in.)
F	20 mm dia. (0.79 in. dia.)
G	47.90 to 47.95 mm dia. (1.8858 to 1.8878 in. dia.)
H	43.90 to 43.95 mm dia. (1.7283 to 1.7303 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.012 in.)

[Press Fit] for Z602/D902-E2B

A	130 mm (5.12 in.)
B	72 mm (2.83 in.)
C	40 mm radius (1.57 in. radius)
D	9 mm (0.35 in.)
E	24 mm (0.95 in.)
F	20 mm dia. (0.79 in. dia.)
G	68 mm dia. (2.68 in. dia.)
H	43.90 to 43.95 mm dia. (1.7283 to 1.7303 in. dia.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.012 in.)

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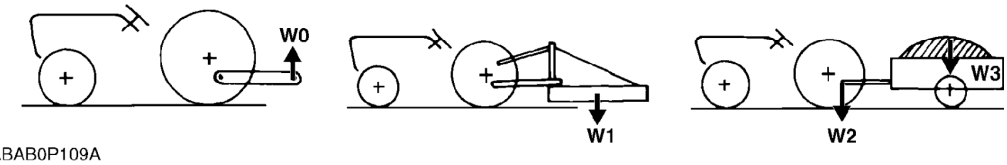
10. IMPLEMENT LIMITATIONS

The KUBOTA Tractor has been thoroughly tested for proper performance with implements sold or approved by KUBOTA. Use with implements which exceed the maximum specifications listed below, or which are otherwise unfit for use with the KUBOTA Tractor may result in malfunctions or failures of the tractor, damage to other property and injury to the operator or others. [Any malfunctions or failures of the tractor resulting from use with improper implements are not covered by the warranty.]

	Tread (max. width) with farm tires		Lower link end max. loading weight W_0
	Front	Rear	
BX1850	880 mm (34.6 in.)	820 mm (32.2 in.)	550 kg (1210 lbs)
BX2350	910 mm (35.8 in.)		

	Actual figures		
	Implement weight W_1 and / or size	Max. Drawbar Load W_2	Trailer loading weight W_3 Max. capacity
BX1850	As in the following list (Shown on the next page)	250 kg (550 lbs)	800 kg (1765 lbs)
BX2350			

Lower link end max. hydraulic lifting capacity .....W_0
Implement weight.....The implement's weight which can be put on the lower link : W_1
Max. drawbar load .....W_2
Trailer loading weight .....The max. loading weight for trailer (without trailer's weight) : W_3



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■ **NOTE**

- **Implement size may vary depending on soil operating conditions.**

Symptom	Probable Cause	Solution	Reference Page
Low Oil Pressure	Engine oil insufficient	Replenish	G-7
	Oil strainer clogged	Clean	1-S29
	Oil filter clogged	Replace	G-13
	Relief valve stuck with dirt	Clean	1-S14
	Relief valve spring weaken or broken	Replace	1-S14
	Excessive oil clearance of crankshaft bearing	Replace	1-S55 to S58
	Excessive oil clearance of crankpin bearing	Replace	1-S54
	Excessive oil clearance of rocker arm	Replace	1-S27
	Oil passage clogged	Clean	–
	Different type of oil	Use specified type of oil	G-7
	Oil pump defective	Repair or replace	1-S35
High Oil Pressure	Different type of oil	Use specified type of oil	G-7
	Relief valve defective	Replace	1-S14
Engine Overheated	Engine oil insufficient	Replenish	1-S22
	Fan belt broken or tensioned improperly	Replace or adjust	G-20
	Coolant insufficient	Replenish	G-7
	Radiator net and radiator fin clogged with dust	Clean	–
	Inside of radiator corroded	Clean or replace	–
	Coolant flow route corroded	Clean or replace	G-22
	Radiator cap defective	Replace	1-S15
	Radiator hose damaged	Replace	G-22
	Overload running	Reduce the load	–
	Head gasket defective	Replace	1-S27
	Incorrect injection timing	Adjust	1-S17
	Unsuitable fuel used	Use specified fuel	G-7

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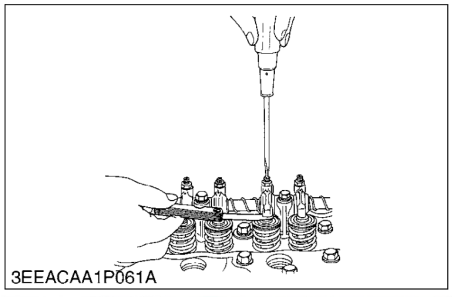
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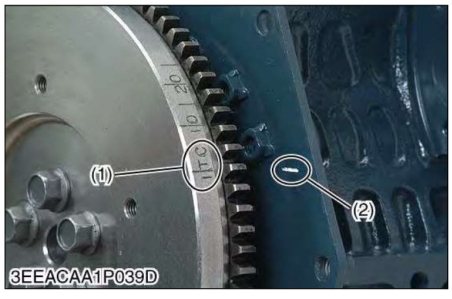

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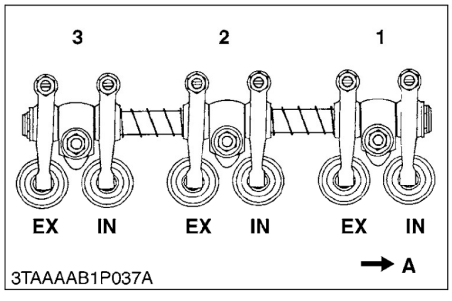

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Checking Valve Clearance

■ **IMPORTANT**

- **Valve clearance must be checked and adjusted when engine is cold.**

1. Remove the cylinder head cover and the glow plugs.
2. Align the **"1TC"** mark (1) on the flywheel and alignment mark (2) on the rear end plate so that the No. 1 piston comes to the compression top dead center.
3. Check the following valve clearance marked with "★" using a feeler gauge.
4. If the clearance is not within the factory specifications, adjust with the adjusting screw.
5. Then turn the flywheel 6.28 rad (360 °), and align the **"1TC"** mark (1) on the flywheel and alignment mark (3) on the rear end plate so that the No. 1 piston comes to the overlap position.
6. Check the following valve clearance marked with "☆" using a feeler gauge.
7. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Number of cylinders / Valve arrangement / Adjustable cylinder location of piston	Intake valve	Exhaust valve
No. 1	★	★
No. 2	☆	★
No. 3	★	☆

Valve clearance marked with "★" can be adjusted.

Intake and exhaust valve clearance (cold)	Factory spec.	0.145 to 0.185 mm 0.00571 to 0.00728 in.

■ **NOTE**

- **The sequence of cylinder numbers is given as No. 1, No. 2 and No. 3 starting from the gear case side.**
- **After adjusting the valve clearance, secure the adjusting screw with the lock nut.**

(1) **"1TC"** Mark
(2) Alignment Mark

A : Gear Case Side

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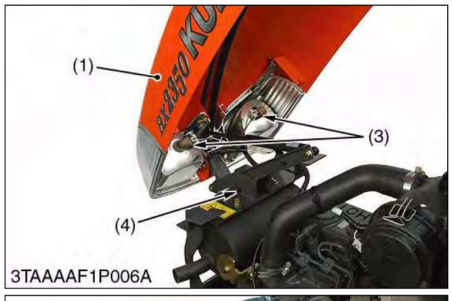

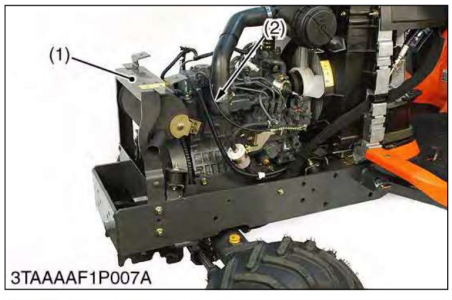

Bonnet and Under Cover

1. Open the bonnet (1), and then loosen the knob bolts and pull forward to remove the under cover (2).
2. Disconnect the connectors (3) for head light and remove the bonnet bracket (4) with bonnet.

(1) Bonnet
(2) Under Cover
(3) Connector
(4) Bonnet Bracket

W1064425

Accelerator Wire, Bonnet Post, Fuel Hoses, Wiring Harness and Others

1. Disconnect the wiring harness (3) from coolant temperature switch, stop solenoid, glow plug, starter motor, engine oil switch, alternator and ground cable.
2. Disconnect the accelerator wire (2).
3. Remove the bonnet post (1).

(1) Bonnet Post
(2) Accelerator Wire
(3) Wiring Harness

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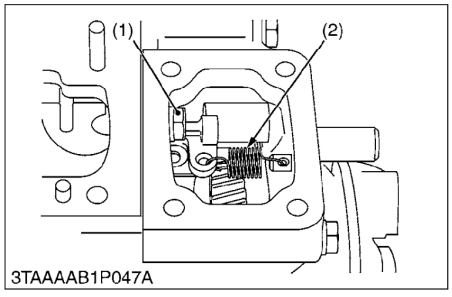

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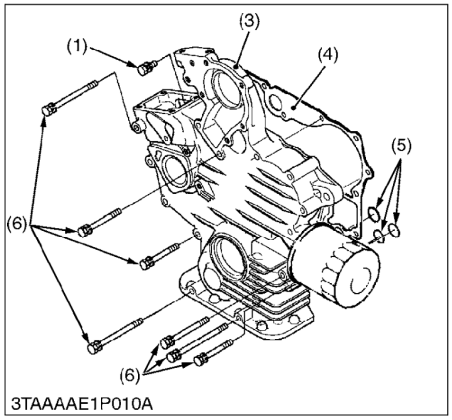

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Gear Case

1. Remove the screw (1) of inside the gear case and outside screws (6).
2. Disconnect the start spring (2) from the fork lever 1.
3. Remove the gear case (4).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to both sides of the gear case gasket (4).
- Be sure to set three O-rings (5) inside the gear case.

(1) Screw (Inside)
(2) Start Spring
(3) Gear Case
(4) Gear Case Gasket
(5) O-ring
(6) Screw

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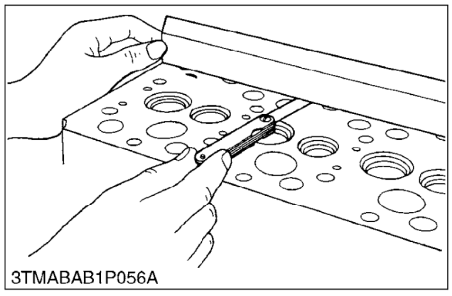
[3] SERVICING

(1) Cylinder Head and Valves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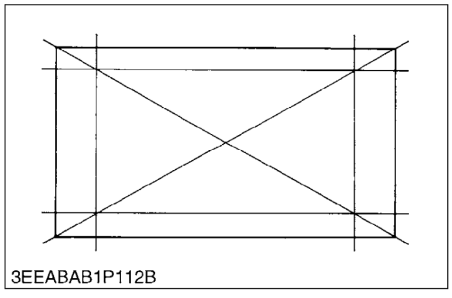
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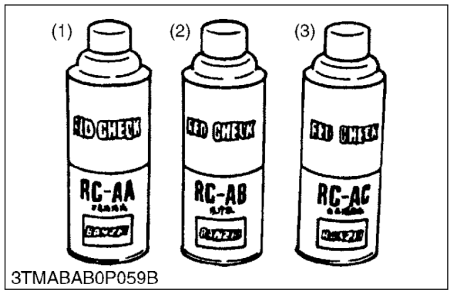

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Cylinder Head Surface Flatness

1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides and two diagonal as shown in the figure.
3. Measure the clearance with a thickness gauge.
4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

■ **IMPORTANT**
- **Do not place the straightedge on the combustion chamber.**
- **Be sure to check the valve recessing after correcting.**

Cylinder head surface flatness	Allowable limit	0.05 mm 0.0020 in.

W1027737

Cylinder Head Flaw

1. Prepare an air spray red check.
2. Clean the surface of the cylinder head with detergent (2).
3. Spray the cylinder head surface with the red permeative liquid (1). Leave it five to ten minutes after spraying.
4. Wash away the read permeative liquid on the cylinder head surface with the detergent (2).
5. Spray the cylinder head surface with white developer (3).
6. If flawed, it can be identified as red marks.

(1) Red Permeative Liquid
(2) Detergent
(3) White Developer

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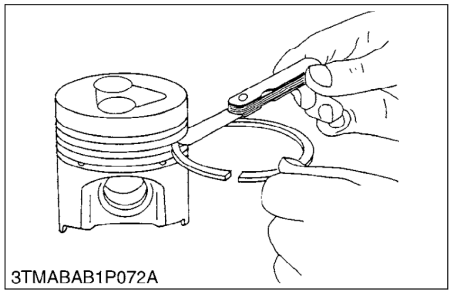
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Clearance between Piston Ring and Piston Ring Groove

1. Clean the rings and the ring grooves, and install each ring in its groove.
2. Measure the clearance between the ring and the groove with a feeler gauge.
3. If the clearance exceeds the allowable limit, replace the piston ring.
4. If the clearance still exceeds the allowable limit after replacing the ring, replace the piston.

Clearance between piston ring and piston ring groove	Second ring	Factory spec.	0.090 to 0.120 mm 0.00354 to 0.00472 in.
		Allowable limit	0.15 mm 0.0059 in.
	Oil ring	Factory spec.	0.04 to 0.08 mm 0.0016 to 0.0031 in.
		Allowable limit	0.15 mm 0.0059 in.

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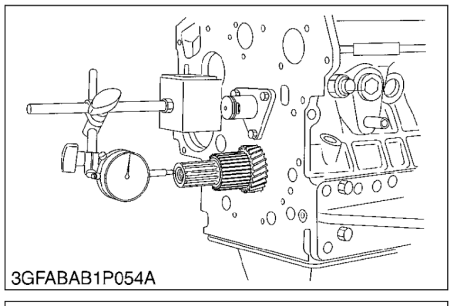
(4) Crankshaft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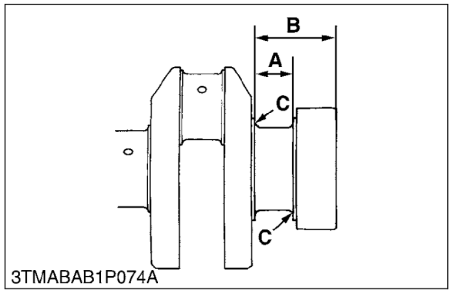

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Crankshaft Side Clearance

1. Set a dial indicator with its tip on the end of the crankshaft.
2. Measure the side clearance by moving the crankshaft to the front and rear.
3. If the measurement exceeds the allowable limit, replace the thrust bearings.
4. If the same size bearing is useless because of the crankshaft journal wear, replace it with an oversize one referring to the table and figure.

Crankshaft side clearance	Factory spec.	0.15 to 0.31 mm 0.0059 to 0.0122 in.
	Allowable limit	0.50 mm 0.0197 in.

(Reference)

- Oversize thrust bearing

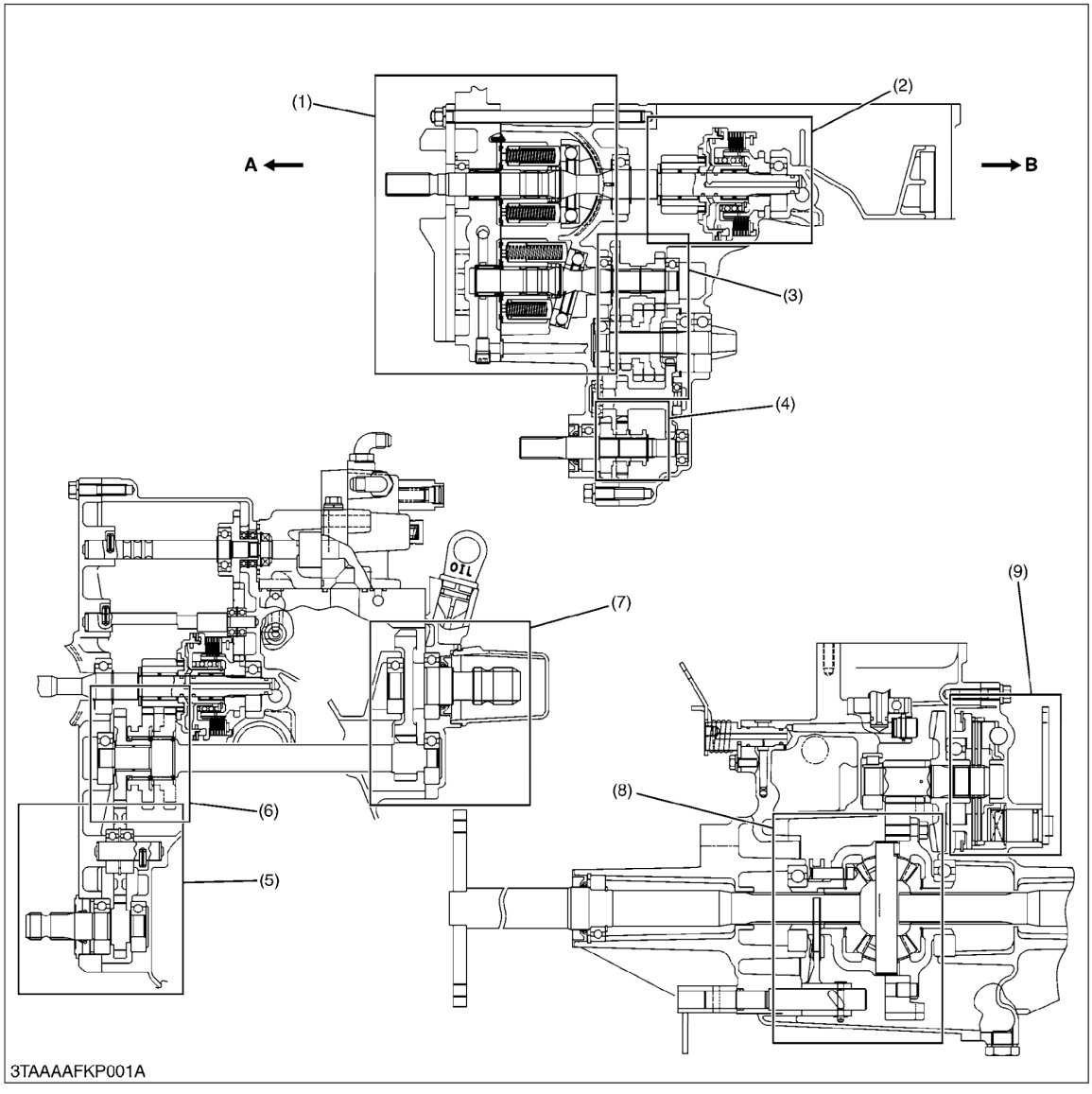
Oversize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Thrust bearing 1 02	15261-23950	020 OS
	Thrust bearing 2 02	15261-23970	020 OS
0.4 mm 0.016 in.	Thrust bearing 1 04	15261-23960	040 OS
	Thrust bearing 2 04	15261-23980	040 OS

- Oversize dimensions of crankshaft journal

Oversize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension **A**	23.40 to 23.45 mm 0.9213 to 0.9232 in.	23.80 to 23.85 mm 0.9370 to 0.9390 in.
Dimension **B**	46.1 to 46.3 mm 1.815 to 1.823 in.	46.3 to 46.5 mm 1.823 to 1.831 in.
Dimension **C**	1.8 to 2.2 mm radius 0.071 to 0.087 in. radius	1.8 to 2.2 mm radius 0.071 to 0.087 in. radius
The crankshaft journal must be fine-finished to higher than ∇∇∇∇.		(0.8S)

W11586190

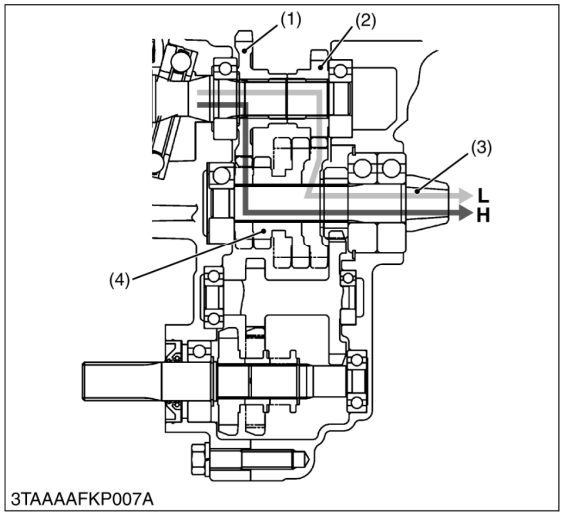
1. STRUCTURE



(1) Hydrostatic Transmission
(2) PTO Clutch Section
(3) Range Gear Shift Section
(4) Front Wheel Drive Gear Section
(5) Mid-PTO Section
(6) PTO Gear Shift Section
(7) Rear PTO Section
(8) Differential Gear Section
(9) Brake Section

A : Front Side
B : Rear Side

[2] RANGE GEAR SHIFT SECTION



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Two kinds of power flow are selected by operating the range gear shift lever to shift the 16T-24T shifter gear (4) on the spiral bevel gear shaft (3).

■ **Low Range**

17T Gear Shaft (2) → Shifter Gear (24T) (4) → Spiral Bevel Pinion Shaft (3).

■ **High Range**

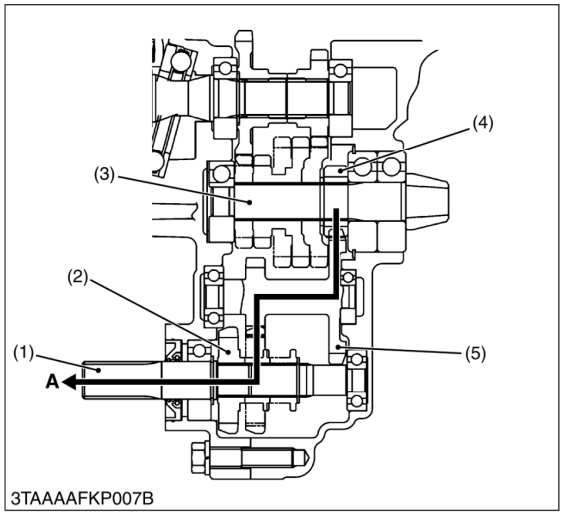
25T Gear (1) → Shifter Gear (16T) (4) → Spiral Bevel Pinion Shaft (3).

(1) 25T Gear
(2) 17T Gear
(3) Spiral Bevel Pinion Shaft
(4) 16T-24T Shifter Gear

L : Low Range
H : High Range

W1014705

[3] FRONT WHEEL DRIVE SECTION



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2-wheel drive or 4-wheel drive is selected by changing the position of 19T shifter gear (2) with the front wheel drive lever.

■ **Front Wheel Drive "Disengaged"**

When the front wheel drive lever is set to **"Disengaged"** position, the 19T shifter gear (2) is neutral and power is not transmitted to the front wheel drive shaft (1).

■ **Front Wheel Drive "Engaged"**

When the front wheel drive lever is set to **"Engaged"** position, the 19T shifter gear (2) slides to the right to engage with 13T-25T gear shaft (5). Therefore, the power from spiral bevel pinion shaft (3) is transmitted to the front wheel drive shaft (1) through the gears.

(1) Front Wheel Drive Shaft
(2) 19T Shifter Gear
(3) Spiral Bevel Pinion Shaft
(4) 12T Gear
(5) 13T-25T Gear Shaft

A : Front Wheel Drive "Engaged"

W1014843

1. TROUBLESHOOTING

HYDROSTATIC TRANSMISSION

Symptom	Probable Cause	Solution	Reference Page
System Will Not Operate in Either Direction	Oil level is low	Check oil level or fill oil to proper level	G-13
	Speed control pedal linkage defective	Repair linkage	2-S21
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-13
		2. Check charge pressure	2-S12
		3. Inspect or flush charge relief valve	2-S41
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	2-S41
	Component parts defective	Replace hydrostatic transmission assembly	2-S25
Vibration and Noise	Oil level is too low	Check oil level or fill oil to proper level	G-13
	Speed control pedal linkage defective	Repair linkage	2-S21
	Charge pressure is too low	Solution order 1. Replace oil filter cartridge	G-13
		2. Check charge pressure	2-S12
		3. Inspect or flush charge relief valve	2-S41
	Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	2-S41
	Component part is defective	Replace hydrostatic transmission assembly	2-S25

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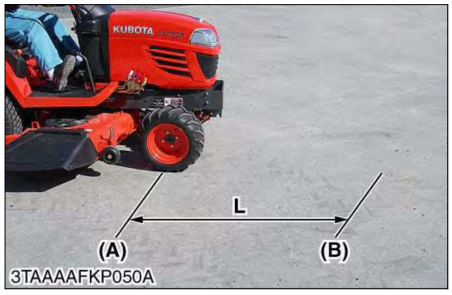

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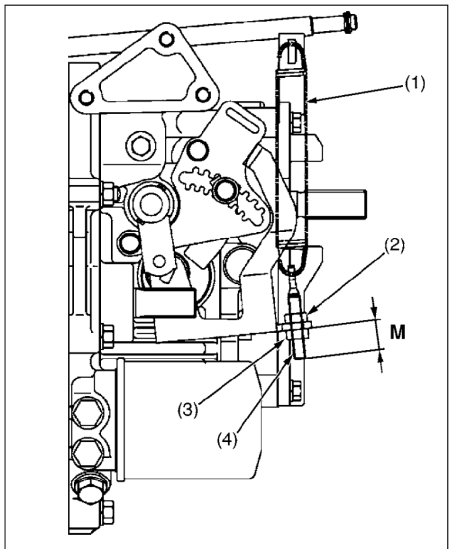

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Checking and Adjusting HST Neutral Spring (for Dynamic Braking)

WARNING

- **Do not operate if tractor move on level ground with foot off speed control pedal.**
- **If tractor moves on level ground with foot off the pedal, or, if the pedal is too slow in returning to "Neutral" position when removing the foot from the pedal, adjust the HST neutral spring.**

The HST neutral spring located under the front right side of the fender can adjust returning speed of speed control pedal.

Since the HST neutral spring tension is weakened, the HST tension should be checked and adjusted every 100 hours.

1. Checking the HST neutral spring tension : Dynamic braking
   - Start the engine and hold the maximum engine speeds.
   - Operate the machine on the concrete level ground.
   - Shift the range gear shift lever to "**High**" position.
   - Depress the speed control pedal to "**Forward**".
   - Release the foot from the speed control pedal.
   - Check the distance between the foot releasing point and the machine stopping point.
   - If the distance is more than approximately 3 m (9.8 feet), strengthen the HST neutral spring tension so that the machine will stop in approximately 3 m (9.8 feet) after releasing the foot from the speed control pedal.

(Reference)

Distance (**L**) between the foot releasing point and the machine stopping point	Reference	Approximately 3 m (9.8 feet)

2. Remove the step from the machine.
   - Loosen the lock nut (2).
   - Turn the adjusting nut (3) half turn to pull the HST neutral spring (1).
   - Tighten and lock the lock nut (2).
   - Start the engine and check dynamic brake as mentioned former.
   - If the machine will not stop with dynamic brake in approximately 3 m (9.8 feet), adjust the neutral spring again.

(Reference)

Length (**M**) of adjusting rod at shipping the machine from the factory	Reference	10 mm 0.39 in.

(1) HST Neutral Spring
(2) Lock Nut
(3) Adjusting Nut
(4) Adjusting Rod

(A) Foot Releasing Point
(B) Machine Stopping Point
L : Distance between Foot Releasing Point and the Machine Stopping Point
M : Length of Adjusting Rod from Stay

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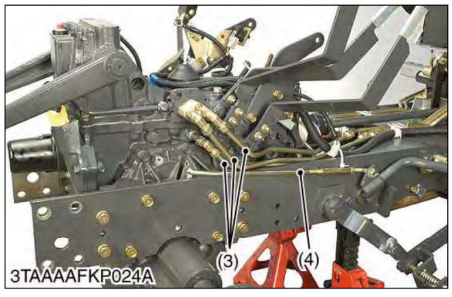

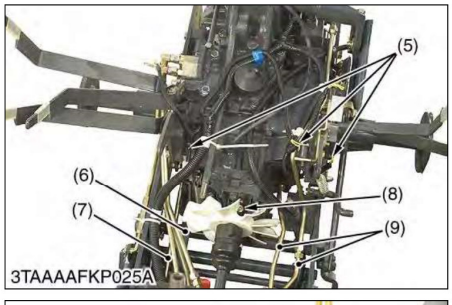

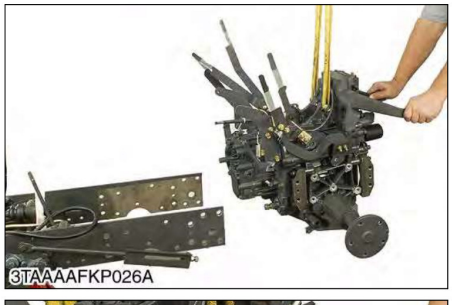

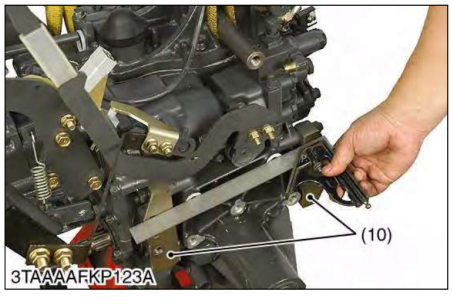

Transaxle Assembly

1. Remove the differential lock rod (1) and disconnect the mower link (2).
2. Remove the brake rod (4).
3. Disconnect the pipes (3). (If equipped.)
4. Disconnect the connector (5).
5. Remove the rear coupling mounting bolt (8).
6. Disconnect the power steering pipes (9).
7. Remove the speed control rod (7).
8. Remove the wire harness clamps
9. Remove the frame brackets (10).

(When reassembling)

- Tighten the smaller bolt (M12) first.
- Before mounting the transaxle assembly on the tractor main frame, check the flatness of the frame brackets with a straight edge securely.

Tightening torque	Transaxle assembly mounting bolt (M12)	62.8 to 72.6 N·m 6.4 to 7.4 kgf·m 46.3 to 53.5 ft-lbs
	Transaxle assembly mounting bolt (M14)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 ft-lbs
	Rear coupling mounting bolt (M8)	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 ft-lbs

(Reference)

- Speed control rod length (7) : 371 mm (14.6 in.)

(1) Differential Lock Rod
(2) Mower Link
(3) Pipe
(4) Brake Rod
(5) Connector
(6) Front Wheel Drive Shaft
(7) Speed Control Rod
(8) Rear Coupling Mounting Bolt
(9) Power Steering Pipe
(10) Frame Bracket

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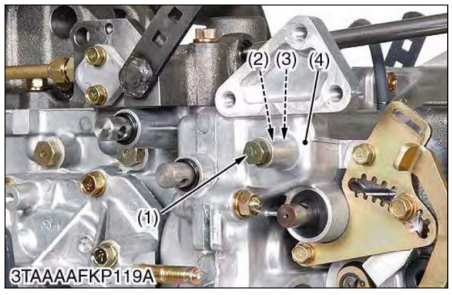
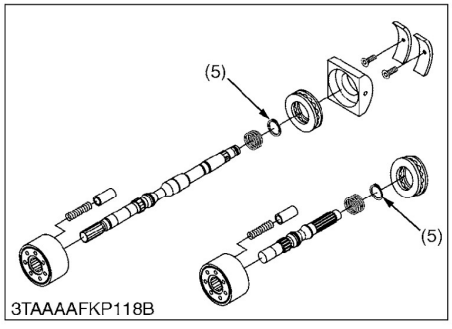
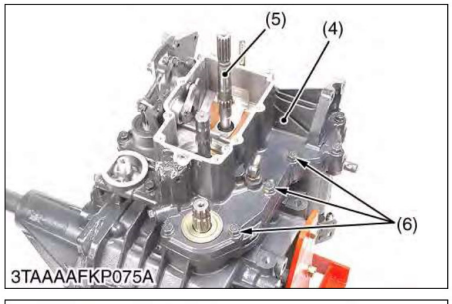
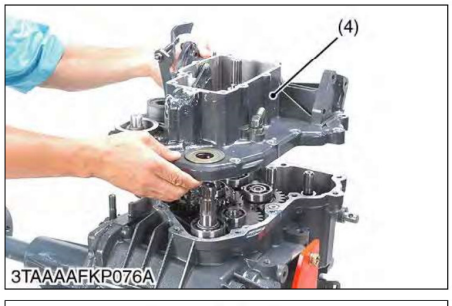
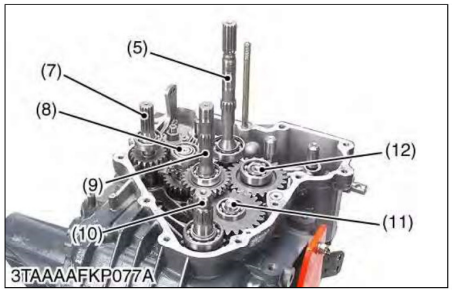
(3) Transaxle Shafts











Transaxle Case Front Cover

■ **NOTE**

- **Before removing the transaxle case front cover (4), remove the 4WD detent bolt (1), the detent spring (2) and the detent ball (3) from the transaxle case front cover (4).**
- **Remove the cir-clip (5) from the HST pump shaft (PTO shaft) from the HST pump shaft (5) and the HST motor shaft securely.**

1. Remove the transaxle case front cover mounting bolts (2).
2. Remove the transaxle case front cover as an unit.

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to the joint surface of the transaxle case to the front cover.

Tightening torque	Transaxle case front cover mounting bolt (M18)	29 to 34 N·m 3.0 to 3.5 kgf·m 21.4 to 25.1 ft-lbs

(1) Transaxle Case Front Cover
(2) Detent Spring
(3) Detent Ball
(4) Transaxle Case Front Cover
(5) HST Pump Shaft (PTO Shaft)
(6) Bolt
(7) 4WD Shaft
(8) Pinion Shaft
(9) HST Motor Shaft
(10) Mid-PTO Shaft
(11) Mid-PTO Idle Gear Shaft
(12) PTO Select Shaft

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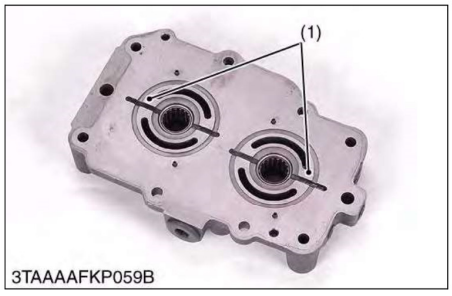
[4] SERVICING

(1) Hydrostatic Transmission



Center Section

1. Check the center section surface (1) for scratches or wear.
2. If deep scratch or excessive wear is found, replace the hydrostatic transmission assembly.

(1) Center Section Surface

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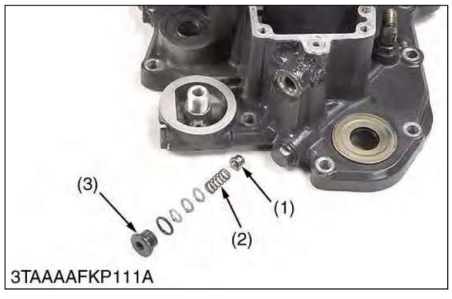

Charge Relief Valve

1. Check the charge relief cone (1) and the spring (2).
2. If defects are found, replace it.

(1) Charge Relief Valve
(2) Spring
(3) Plug

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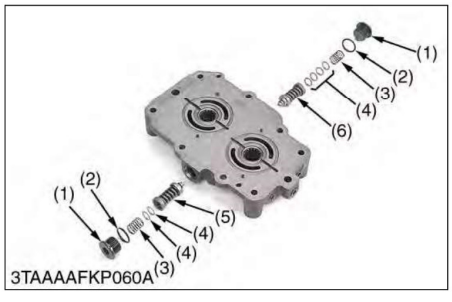

Check and High Pressure Relief Valve

1. Check the check and high pressure relief valve (5), (6) for scratches and damage.
2. Check the spring (3) for breakage and wear.
3. If anything are unusual, replace the check and high pressure relief valve as complete assembly.

■ **NOTE**

- **Check and high pressure relief valve (reverse) has a pin hole (1.5 mm, 0.059 in.).**

(1) Plug
(2) O-ring
(3) Spring
(4) Shim
(5) Check and High Pressure Relief Valve (Forward)
(6) Check and High Pressure Relief Valve (Reverse)

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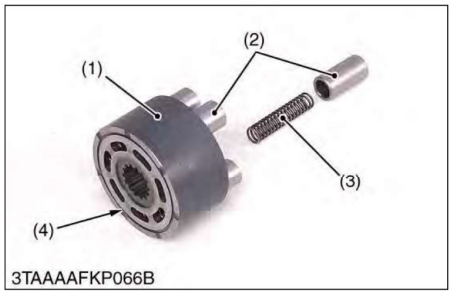


Cylinder Block Assembly

1. Check the cylinder blocks (1) and the pistons (2) for scratches and wear.
2. If there are scratch or worn, replace the cylinder block assembly.
3. Check the pistons for their free movement in the cylinder block bores.
4. If the piston or the cylinder block is scored, replace the cylinder block assembly.
5. Check the polished face (4) of the cylinder block for scoring. If it is scored, replace the cylinder block assembly.

■ **IMPORTANT**

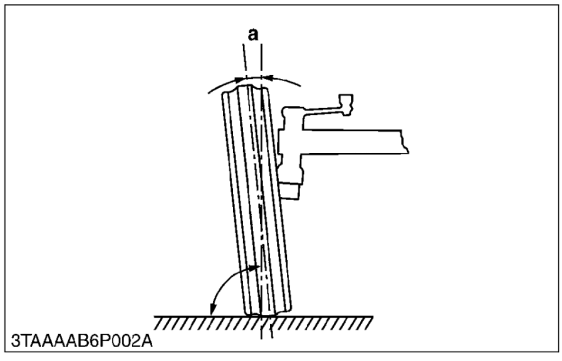
- **Do not intercharge the pistons between the pump cylinder block and the motor cylinder block. Pistons and cylinder blocks are matched.**

(1) Cylinder Block
(2) Piston
(3) Spring
(4) Polished Face

W1093936

2. FRONT WHEEL ALIGNMENT

To assure smooth mobility or maneuverability and enhance stable and straight running, the front wheels are mounted at an angle to the right, left and forward directions. This arrangement is referred to as the Front Wheel Alignment.



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■ Camber

The front wheels are tilted from the vertical as viewed from the front, upper wheels are spreader than lower ones.

This inclination is called camber (**a**). Camber reduces bending or twisting of the front axle caused by vertical load or running resistance, and also maintains the stability in running.

Camber	0.035 rad 2 °

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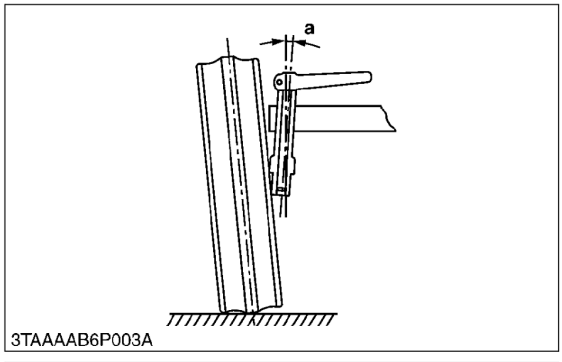

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■ Kingpin Angle

The Kingpin is titled from the vertical as viewed from the front.

This angle is called kingpin angle (**a**). As with the camber, kingpin angle reduces rolling resistance of the wheels, and prevents any shimmy motion of the steering wheel.

It also reduces steering effort.

Kingpin angle	0.209 rad 12 °

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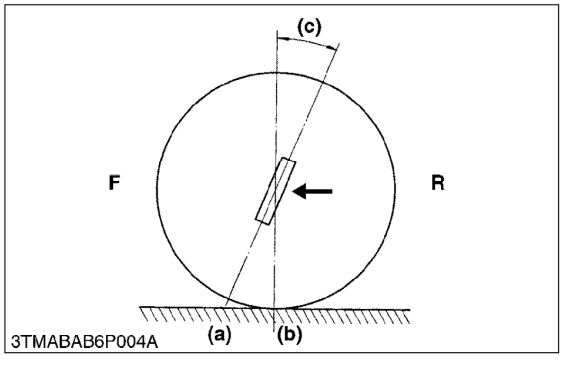

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■ Caster

The kingpin is titled forward as viewed from the side. The point **(b)** of the wheel center line is behind the point **(a)** of the kingpin shaft center line.

This inclination is called caster **(c)**. Caster helps provide steering stability.

As with the kingpin inclination, caster reduces steering effort.

Camber	0 rad 0 °

F : Front **R : Rear**

W1013142

Flywheel Cover and Power Steering Hose [BX1850]

1. Remove the flywheel cover (1).
2. Disconnect the power steering cylinder hoses (2).

(When reassembling)

Tightening torque	Power steering cylinder hose	23.6 to27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 ft-lbs

(1) Flywheel Cover (2) Power Steering Cylinder Hose

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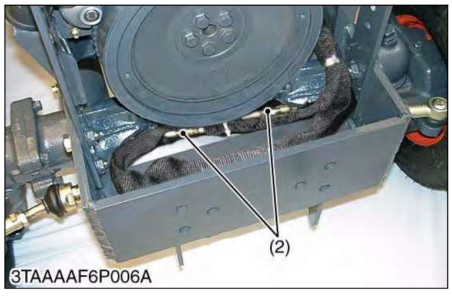

Front Wheel and Propeller Shaft Cover

1. Lift up the front of tractor and place the disassembling stand under the front axle frame.
2. Remove the front wheels.
3. Remove the propeller shaft cover mounting bolt and slide the propeller shaft cover (1).

(When reassembling)

Tightening torque	Front wheel mounting screw	149.2 to 179.0 N·m 15.3 to 18.2 kgf·m 110 to 132 ft-lbs

(1) Propeller Shaft Cover

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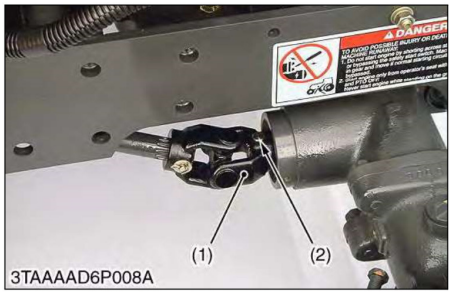

Disconnecting Propeller Shaft

1. Tap out the spring pins (2) and disconnect the universal joint (1) and spiral bevel pinion shaft.

(When reassembling)

- Apply grease to the splines of the propeller shaft and universal joint.

(1) Universal Joint (2) Spring Pin

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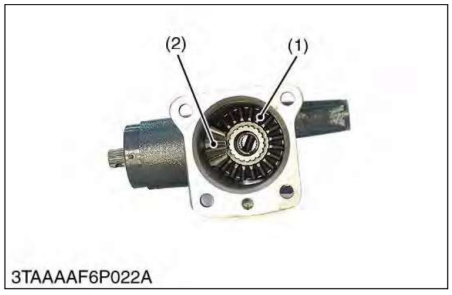

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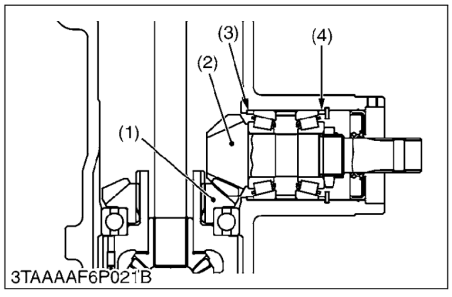

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Backlash between Bevel Pinion Shaft and Bevel Gear [BX2350]

1. Put the solder (0.5 mm (0.020 in.) thickness) on the position where the tooth proper contact of bevel pinion shaft.
2. Fix the bevel gear and rotate the bevel pinon shaft carefully.
3. Measure the backlash by thickness of the point where solder is the thinnest.
4. If the backlash is not within the factory specifications, change the adjusting collars (3), shims (4). For example change the adjusting shim (4) to 0.1 mm (0.004 in.) smaller size, and change the adjusting collar (3) to 0.1 mm (0.004 in.) larger size.
5. Adjust the backlash properly by repeating the above procedures.

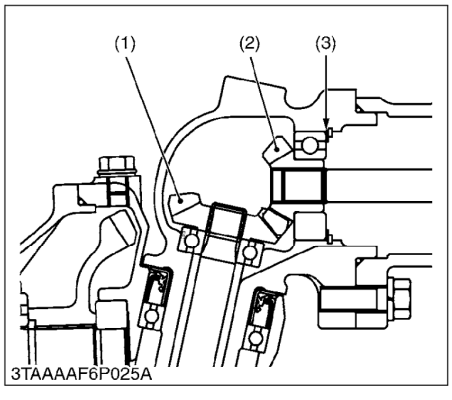
Backlash between bevel pinion shaft and bevel gear	Factory spec.	0.1 to 0.3 mm 0.004 to 0.012 in.

(Reference)

- Above factory specification should be measured on the tooth of bevel pinion. When measuring the backlash on the spline of its shaft, factory specification will be 0.0571 to 0.1714 mm (0.00225 to 0.00675 in.).
- Thickness of adjusting collars (3), (4) :
  3.4 mm (0.134 in.) 4.1 mm (0.161 in.)
  3.6 mm (0.142 in.) 4.2 mm (0.165 in.)
  3.8 mm (0.150 in.) 4.4 mm (0.173 in.)
  3.9 mm (0.154 in.) 4.5 mm (0.177 in.)
  4.0 mm (0.157 in.) 4.6 mm (0.181 in.)

(1) Bevel Gear
(2) Bevel Pinion Shaft
(3) Adjusting Collar
(4) Adjusting Collar

W10301800



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Backlash between 9T Bevel Gear and 13T Bevel Gear [BX1850]

1. Stick a strip of fuse to three spots on the 13T bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the thickness of the fuses with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between 9T bevel gear and 13T bevel gear	Factory spec.	0.1 to 0.3 mm 0.004 to 0.012 in.

(Reference)

- Thickness of adjusting shims (3) :
  0.6 mm (0.024 in.) 1.2 mm (0.047 in.)
  0.8 mm (0.031 in.) 1.4 mm (0.055 in.)
  1.0 mm (0.039 in.) 1.2 mm (0.047 in.)
- Tooth contact : More than 35 %

(1) 13T Bevel Gear
(2) 9T Bevel Gear
(3) Shim

W10304800

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-8.)

Item	N·m	kgf·m	ft-lbs
Steering wheel mounting nut	20 to 25	2.0 to 2.6	14.8 to 18.4
Power steering hose	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
Power steering cylinder mounting screw	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Tie-rod slotted nut	17.7 to 34.3	1.8 to 3.5	13.0 to 25.3
Tie-rod screw	74 to 84	7.5 to 8.6	54.6 to 61.9

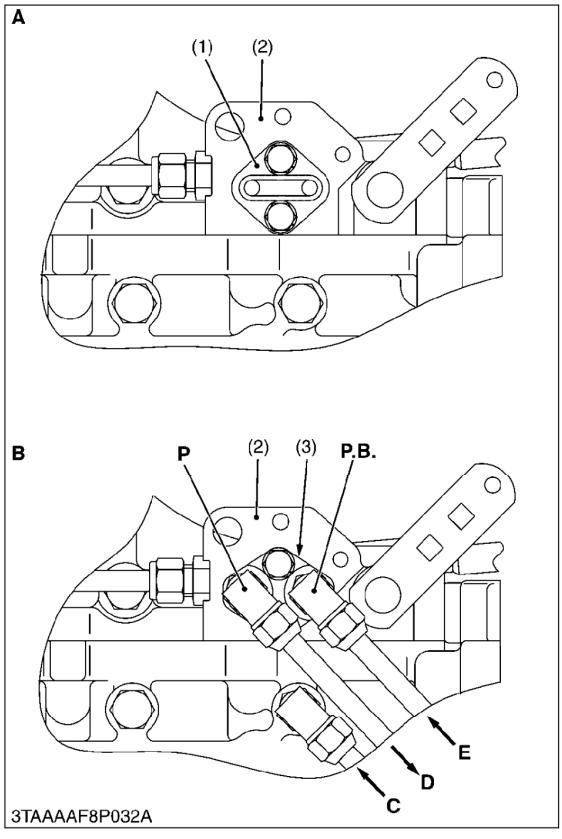
W1012736

MECHANISM

CONTENTS

KiSC issued 08, 2019 A

7. HYDRAULIC BLOCK TYPE OUTLET



The hydraulic block type outlet is located on the hydraulic cylinder assembly.

This hydraulic block type outlet is provided to take power out from the tractor to operate the hydraulic cylinders on the implement, such as front end loader, front snow blade and so on.

(1) Block Cover
(2) Hydraulic Cylinder
(3) Hydraulic Block

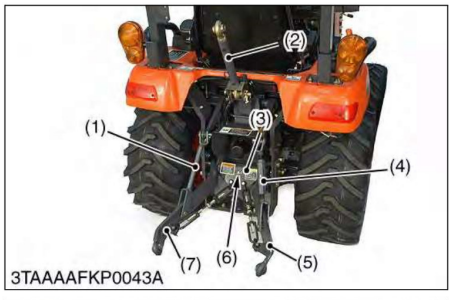
P : P Port (Pump)
P.B. :P.B. Port (Power Beyond)

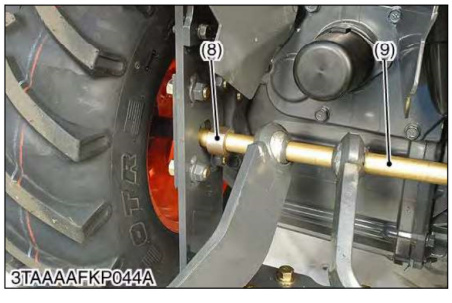
A : When Loader Valve is not Attached
B : When Loader Valve is Attached
C : To Transmission Case
D : To Implement
E : From Implement

W1014064

[2] PREPARATION

(1) Separating Hydraulic Cylinder





Battery

CAUTION

- **When disconnecting the battery cables, disconnect the negative cable from the battery first. When connecting, connect the positive cable to the battery first.**

1. Remove the under panel (1).
2. Disconnect the negative cable (2) from the battery.

(1) Under Panel
(2) Battery
(3) Negative Cable

W1026961

Lift Rod and Lower Link

1. Remove the top link (2).
2. Remove the stopper pin (6) and remove the check chain plate (3).
3. Move the bushes (8) to inside.
4. Move the shaft (9) to right side and remove the lower link as a unit.

(1) Lift Rod LH
(2) Top Link
(3) Check Chain Plate
(4) Lift Rod RH
(5) Lower Link RH
(6) Stopper Pin
(7) Lower Link LH
(8) Bush
(9) Shaft

W1036139

[4] SERVICING

(1) Hydraulic Pump


3TAAAAF8P038A

Clearance between Tip of Gear Tooth and Casing

1. Measure the gear O.D. with an outside micrometer.
2. Measure the casing I.D. with a cylinder gauge and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace the assembly.

Clearance between tip of gear tooth and casing	Allowable limit	0.15 mm 0.0059 in.

Gear O.D.	Factory spec.	33.520 to 33.530 mm 1.3197 to 1.3200 in.
Case I.D.	Factory spec.	33.570 to 33.577 mm 1.3217 to 1.3219 in.

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3TAAAAF8P039A


3TAAAAF8P040A

Clearance between Bushing and Shaft

1. Measure the gear shaft O.D. with an outside micrometer.
2. Measure the bushing I.D. with a cylinder gauge and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between bushing and shaft	Factory spec.	0.020 to 0.091 mm 0.0008 to 0.0036 in.
	Allowable limit	0.12 mm 0.0047 in.

Shaft O.D.	Factory spec.	14.970 to 14.980 mm 0.5894 to 0.5898 in.
Bushing I.D.	Factory spec.	15.000 to 15.061 mm 0.5906 to 0.5930 in.

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3TAAAAF8P041A


3TAAAAF8P042A

Side Plate Thickness

1. Measure the side plate thickness with an outside micrometer.
2. If the thickness is less than the allowable limit, replace it.

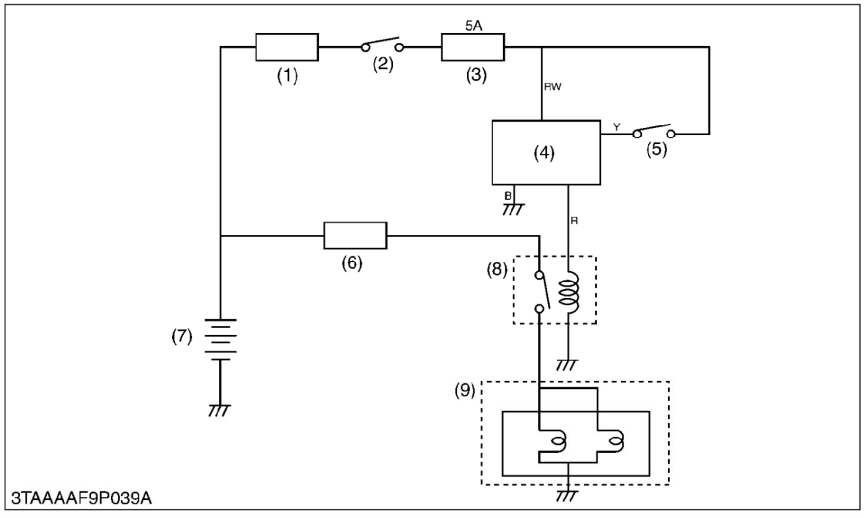
Side plate thickness	Factory spec.	2.48 to 2.50 mm 0.0976 to 0.0984 in.
	Allowable limit	2.40 mm 0.0945 in.

W1016194

[3] OPERATOR PRESENCE CONTROL (OPC)

The BX50 Series Tractor equips operator presence control (OPC) system which automatically stops the engine when operator stands up from the operator's seat while shifting the PTO lever or the speed control pedal.

Tractor without the OPC timer stops quickly and tractor with the OPC timer stops in approximately one second when standing up from the seat.



(1) Slow Blow Fuse
(2) Main Switch
(3) Fuse (10A)
(4) OPC Timer
(5) Seat Switch (From Seat Switch **ON** or **OFF**)
(6) Fuse
(7) Battery
(8) Engine Stop Solenoid Timer Relay
(9) Engine Stop Solenoid

W1025506

■ **Electrical Circuit (Tractor with OPC Timer)**

General electrical circuit of the tractor OPC timer is shown in the figure.

1. When sitting on the operator's seat in the state of the main switch "**ON**", the battery voltage passes to the seat switch and the OPC timer (4), and maintain the solenoid relay (8).
2. When standing up from the operator's seat, the circuit from the seat switch to the OPC timer is cut.
   However, if the PTO lever (or the speed control pedal) are set at "**Neutral**" position, the circuit from the battery to the solenid relay (8) is formed with the PTO switch (or HST switch).
3. When standing up from the operator's seat while shifting the levers, the circuit from the battery to the solenoid relay (8) is cut, and the engine is stopped by function of the solenoid (9).

■ **Seat Switch**

The seat switch has two positions.

When the operator's seat is occupied, the switch contact point is at "**ON**" position. When the operator's seat is not occupied, its contact point is at "**OFF**" position.

■ **OPC Timer**

OPC timer is located electrically at between the seat switch (5) and the solenoid relay (8).

When the current supply from the seat switch (5) is cut, the OPC timer (4) adopted for the OPC system has maintained the state of "**ON**" position for approximately one second.

W1025648

LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown (15 A)	Replace	G-30
	Bulb blown	Replace	G-31
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and head light switch, between head light switch and head light)	Repair or Replace	–
Tail Light Does Not Light	Fuse blown (15 A)	Replace	G-30
	Bulb blown	Replace	G-31
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and head light switch, between head light switch and tail light)	Repair or Replace	–
Illumination Light Does Not Light	Fuse blown (15 A)	Replace	G-30
	Bulb blown	Replace	–
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and head light switch, between head light switch and illumination light)	Repair or Replace	–
Hazard Light Does Not Light	Fuse blown (15 A)	Replace	G-30
	Bulb blown	Replace	G-31
	Wiring harness disconnected or improperly connected	Repair or Replace	–
	Flasher unit defective	Replace	6-S22
	Hazard switch defective	Replace	6-S21
Hazard Indicator Lamp Does Not Light	Bulb blown	Replace	–
	Wiring harness disconnected or improperly connected	Repair or Replace	–
Hazard Light Does Not Flicker	Flasher unit defective	Replace	6-S22
Turn Signal Light Does Not Light	Fuse blown (15 A)	Replace	G-30
	Bulb blown	Replace	G-31
	Wiring harness disconnected or improperly connected	Repair or Replace	–
	Flasher unit defective	Replace	6-S22
	Blinker switch defective	Replace	6-S21
Turn Signal Light Indicator Lamp Does Not Light	Bulb blown	Replace	G-31
	Wiring harness disconnected or improperly connected (blinker switch and indicator lamp)	Repair or Replace	–
Turn Signal Light Does Not Flicker	Flasher unit defective	Replace	6-S22
	Blinker switch defective	Replace	6-S21

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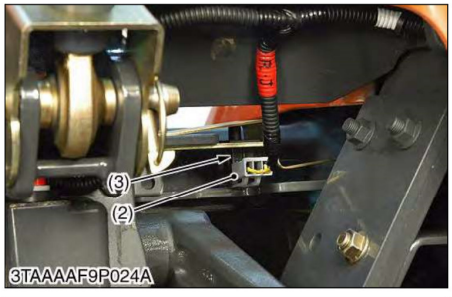
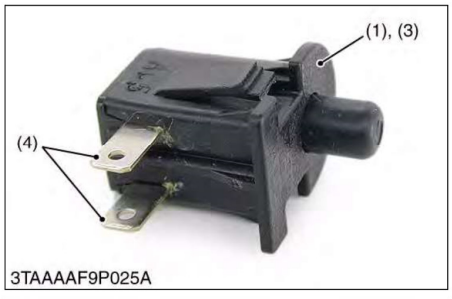
(6) Operator Presence Control (OPC) Switch





Seat Switch and Seat Turnover Switch Continuity Check

1. Disconnect the 2P connectors (2) from the seat switch (1) and the seat turnover switch (3).
2. Remove the seat switch and the seat turnover switch.
3. Connect the circuit tester to the terminals (4).

(When switch is not pushed)

1. Measure the resistance between terminals (4).
2. If continuity is not infinity, the switch is faulty. Replace it.

(When switch is pushed)

1. Measure the resistance between terminals (3).
2. If continuity is not 0 Ω, the switch is faulty. Replace it.

Resistance	When switch is not pushed	Infinity
	When switch is pushed	0 Ω

(1) Seat Switch
(2) **2P** Connector
(3) Seat Turnover
(4) Terminals

[A] Seat Switch is not Pushed
[B] Seat Switch is Pushed

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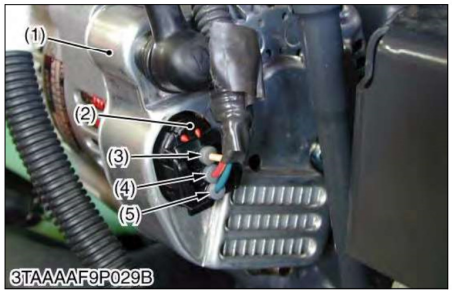

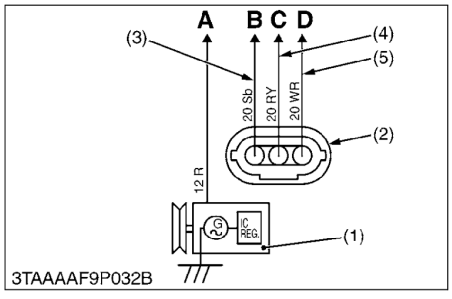

Charge Lamp (Charging Circuit)

1. Disconnect the **3P** connector from the alternator after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead from the wiring harness connector terminal (White / Red) to the chassis.

■ **NOTE**

- **If you connect the jumper lead from the wiring harness connector terminal (White / Red) to the chassis, 15A fuse will be blown. Do not connect the lead to Red / Yellow terminal.**

3. If the charge lamp does not light, the wiring harness or fuse is faulty.

(1) Alternator
(2) **3P** Connector
(3) **Sb** (Sky Blue) Terminal
(4) **RY** (Red / Yellow) Terminal
(5) **WR** (White / Red) Terminal

A : To Main Switch
B : To Hour Meter and Tachometer
C : To Change Lamp
D : To Ground

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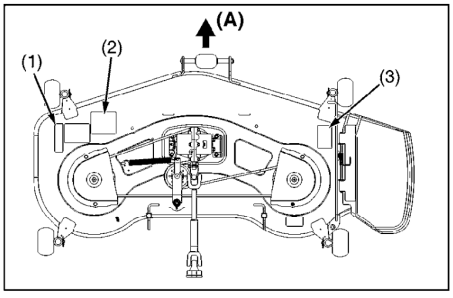
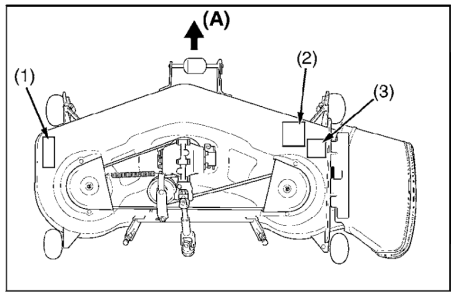
[RCK54P-23BX]



(A) Forward

[RCK48P-18BX]



(A) Forward

(1) Part No. K5617-7311-1

1BDABBSAP0030

(2) Part No. K5617-7312-1

1BDABBSAP0020

(3) Part No. K5763-4715-1

1BDACADAP002E

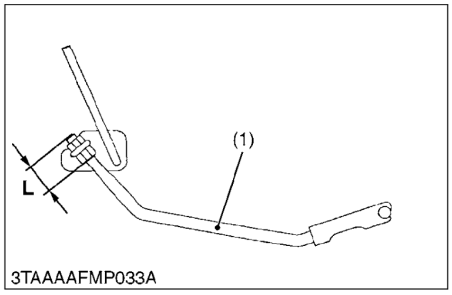
CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your local KUBOTA dealer.
4. If a component with danger, warning or caution label (s) affixed is replace with new part, make sure new label (s) is (are) attached in the same locations (s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

3TAAAAFCP002A

SERVICING

CONTENTS



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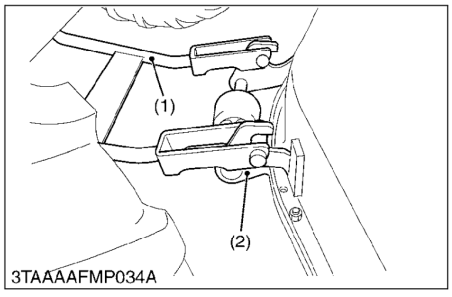

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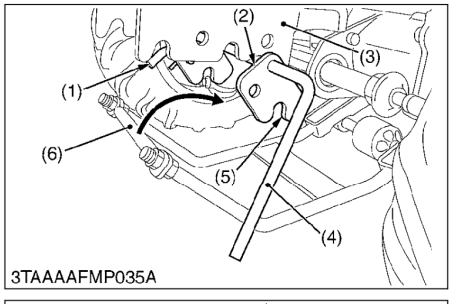

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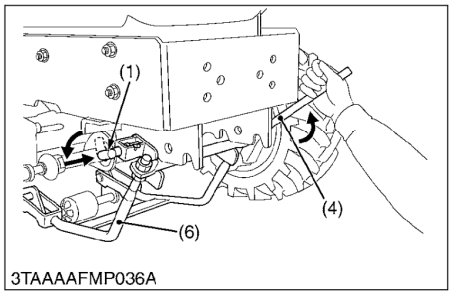

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Front Link

1. Hook the front link (1) to the front bracket groove (2) as shown in the figure.

(Reference)

- Make sure the length (**L**) of the front link (1) is 47 mm (1.85 in.).

(1) Front Link
(2) Front Bracket Groove

W74569821

Mounting Front Link

1. Position the front lever to the front link bracket.
2. Pull and lock the L pin. Then lower the front lever.
3. Hook the front link to the lever fulcrum, and lift the front lever.
4. Release the L pin to lock the front lever.

■ **NOTE**

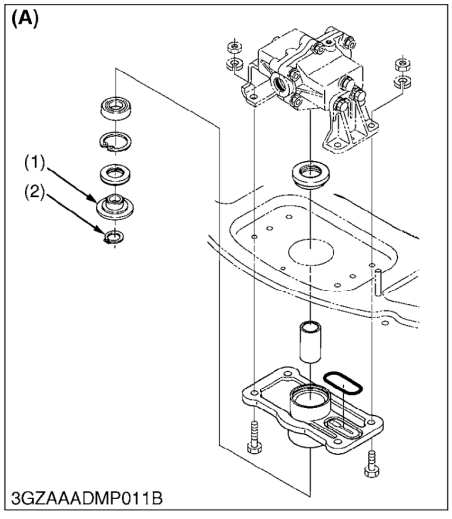
- **When hooking the front link to the lever fulcrum, normal position of the lever fulcrum groove is open to downward.**

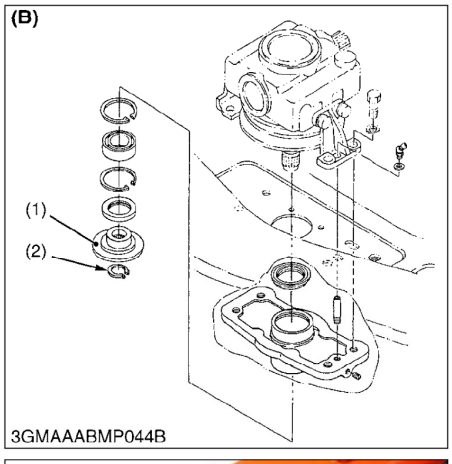
■ **IMPORTANT**

- **Check that the front lever is locked securely with the L pin.**

(1) L pin
(2) Lever Fulcrum
(3) Front Link Bracket
(4) Front Lever
(5) Lever Fulcrum Groove
(6) Front Link

W1028530





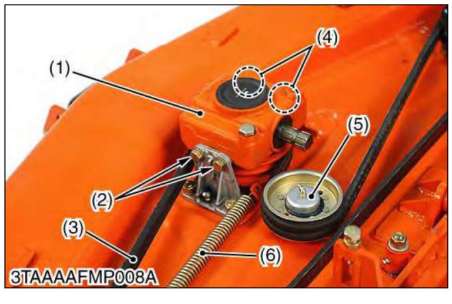
Blade Boss

1. Remove the external snap ring (2).
2. Remove the blade boss (1).

(1) Blade Boss
(2) External Snap Ring

(A) RCK48P-18BX, RCK54P-23BX
(B) RCK48-18BX, RCK54-23BX, RCK60B-23BX

W1012871



Gear Box and Mower Belt

1. Turn over the mower.
2. Remove the mower belt (3) from the tension pulley (5).
3. Unscrew the left and right gear box mounting screws (2), (4) and remove the gear box (1) from the mower deck.

(When reassembling)

- Install the reamer screws (2) at their original positions as shown in the figure.

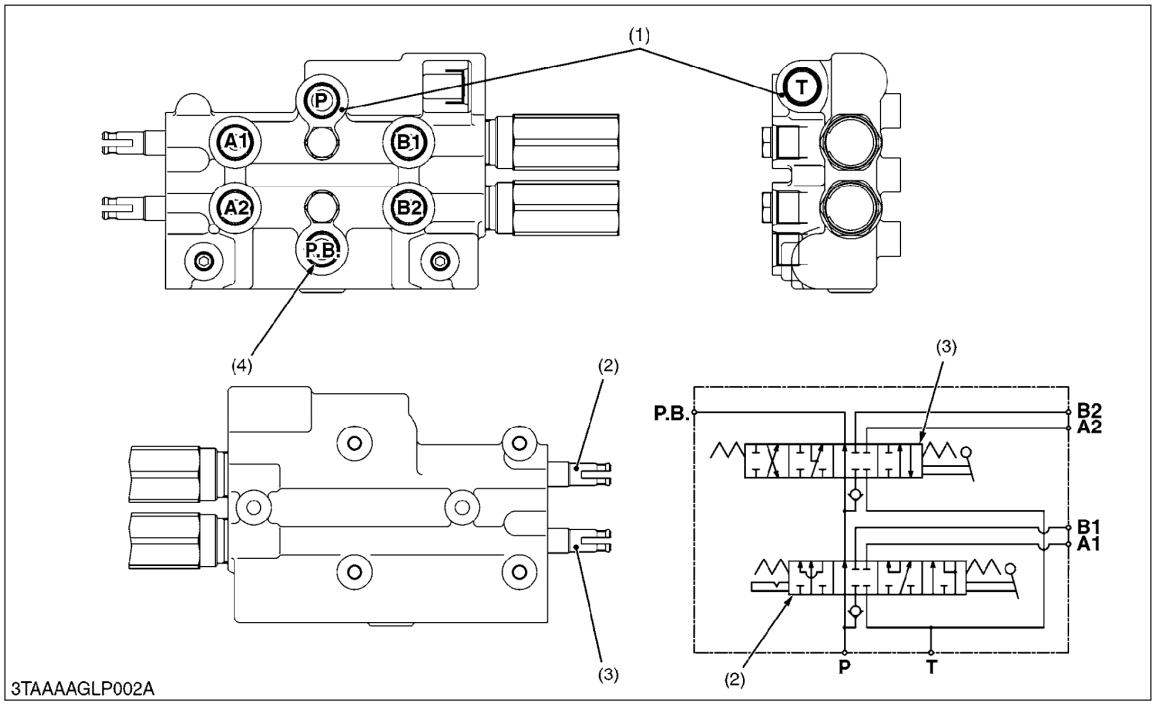
Tightening torque	Gear box mounting screw and nut	77.4 to 90.2 N·m 7.9 to 9.2 kgf·m 57.1 to 66.5 ft-lbs
	Gear box mounting screw (for aluminum gear case)	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft-lbs

(1) Gear Box
(2) Gear Box Mounting Screw (Reamer Screw)
(3) Mower Belt
(4) Gear Box Mounting Screw
(5) Tension Pulley
(6) Tension Spring

W1012961

2. CONTROL VALVE ASSEMBLY

[1] STRUCTURE



(1) Inlet and Outlet Section
(2) Boom Control Valve
(3) Bucket Control Valve
(4) Power Beyond

P : P Port (From Pump)
T : T Port (To Tank)

A1 : A1 Port
A2 : A2 Port

B1 : B1 Port
B2 : B2 Port
P.B. :P.B. Port

The control valve assembly is composed of one casting block and four major section as shown above.

(1) Inlet and Outlet Section

This section has **P** and **T** ports.

The **P** port is connected to the **OUTLET** port of hydraulic block by the hydraulic hose.

The **T** port is connected to the **TANK** port of hydraulic block by the hydraulic hose.

(2) Boom Control Section

The boom control valve is of 4-position, 6-connection, detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A1** and **B1** ports and controls oil flow to the boom cylinder.

(3) Bucket Control Section

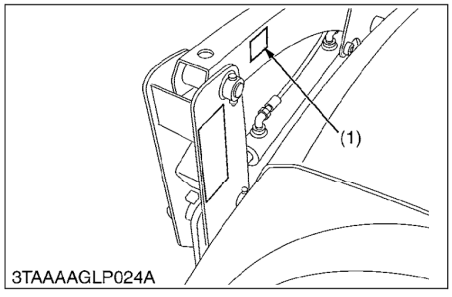
The bucket control valve is of 4-position, 6-connection, no detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A2** and **B2** ports and controls oil flow to the bucket cylinder.

(4) Power Beyond

This section has **P.B.** port which is connected to the **INLET** port of hydraulic block by the hydraulic hose, and feeds oil to the three point hydraulic control valve.

1. GENERAL

[1] IDENTIFICATION

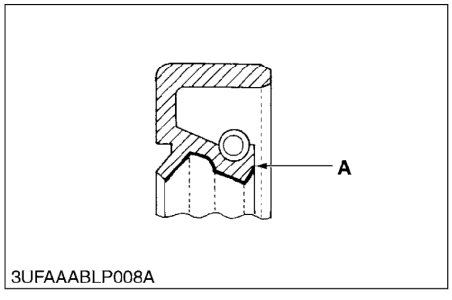


When contacting your local KUBOTA distributor, always specify front loader model and serial number.

(1) Model / Serial Number

W1010468

[2] GENERAL PRECAUTION



- During disassembly, carefully arrange removed parts in a clean area to prevent later confusion. Screws, bolts and nuts should be replaced in their original positions to prevent reassembly errors.
- When special tools are required, use genuine KUBOTA tools. Special tools which are not used frequently should be made according to the drawings provided.
- Clean parts before measuring them.
- Use only genuine KUBOTA parts for parts replacement to maintain loader performance and to assure safety.
- O-ring and oil seals must be replaced during reassembly. Apply grease to new O-rings or oil seals before reassembling.

A : Grease

W1010531